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A STUDY ON VECTOR BORNE DISEASES CONTROL (MALARIA) IN VIJAYAWADA CITY

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ABSTRACT

Mosquito-borne diseases, including malaria, Japanese encephalitis (JE), lymphatic filariasis and dengue, are major public health concerns in the Andhra Pradesh, deterring equitable socioeconomic and industrial development. Among these, malaria and JE are the predominant infections and are spread across the state. The incidence of malaria is, however, gradually receding, with a consistent decline in cases over the past few years, although entry and spread of artemisin in-resistant *Plasmodium falciparum* remains a real threat in the country. Control of these diseases requires robust disease surveillance and integrated vector management on a sustained basis, ensuring universal coverage of evidence-based key interventions based on sound epidemiological data. This paper aims to present a comprehensive review of the status of vector borne diseases in Andhra Pradesh and to address the key challenges. One of the most common problems associated with the poorly designed landfills and poorly managed solid waste is that it leads to attraction of large number of vectors such as female Anopheles, which is responsible for the proliferation of breeding sites of mosquitoes causing Vector borne diseases such as Malaria.. The present study was carried out through survey and conducted for about 250 houses in six prone areas of vectors in Vijayawada. These areas mainly included Singh nagar Vombay Colony, Chintugunta. Ranigarithota, One Town, areas near Chlorea hospital which includes hilly mountains areas, Vidhyadharipuram, etc.. Here identification of vectors was carried out in fresh water, drains, drainage using sampling techniques. This helped in detection of mosquitoes. Subsequently control measures were carried out in peri-domestic places.

Keywords: Malaria, Vector born disease, Anopheles.

INTRODUCTION

Vector-borne diseases, including malaria, Japanese encephalitis (JE), lymphatic filariasis and dengue / chikungunya, continue to plague tropical countries globally. These diseases cause considerable illness and mortality in India, where over 1 billion people are living at risk of infection, contributing the majority of cases in the World Health Organization (WHO) [1-4]. Despite accumulated knowledge on disease epidemiology and additional inputs under the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), these communicable diseases continue to inflict ill health and deter equitable socio economic development across India. Andhra Pradesh is currently witnessing rapid ecological changes, owing to unprecedented population growth on account of human migration, urbanization and environmental degradation; this creates opportunities for vector proliferation and increased receptivity [6-7]. Given the health infrastructure and interventions for disease management, malaria, JE and lymphatic filariasis continue to persist, while dengue is a relatively recent introduction and emerging as a public health concern in Andhra Pradesh, with imminent threat to the other north-eastern states of India. This paper aims to present a comprehensive overview of the present status of vector borne diseases, with major emphasis on malaria

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using unpublished data from the state disease surveillance program [8-9].

MALARIA

Malaria is a major public health illness in Andhra Pradesh. All districts are co-endemic for *Plasmodium falciparum* and *P. vivax*. The transmission intensities vary across districts and are estimated to be low to moderate. *P. falciparum* is the predominant infection and is solely responsible for a high proportion of cases and attributable deaths. Transmission of the causative parasites is typically perennial, with a high rise in cases during April to September, corresponding to the wet season/months of heavy rainfall. Cases were also recorded in other months of the year (dry season) but the intensity of transmission was less marked [10-11]. This transmission pattern was quite consistent but trends showed a clear and steady decline each year, evidenced by a substantial reduction in the number of cases. However, the number of reported cases may be minuscule in comparison to the actual disease burden, which includes many more unreported/ undiagnosed/misdiagnosed cases and those treated in the private/public sector, which are normally not captured by the state surveillance. Furthermore, there is a huge asymptomatic reservoir (estimated to be 8–33% of ethnic communities), for which there is no mechanism for case detection and treatment [12]. Today, elimination of malaria is feasible with scientific approaches as envisaged by WHO. The main components of the strategy comprise case surveillance; ensuring early diagnosis using rapid diagnostic kits and/or microscopy; vector control by indoor residual spraying and LLINs; and treatment with evidence-based artemisinin-based combination therapy. There are other supportive elements of community participation and awareness programmes that use information, education and communication to prevent creation of habitats for vector proliferation; strengthening public health services for improved access to treatment and monitoring of artemisinin resistance; prevention of malaria invasion from the neighbouring states/countries; and resource mobilization, which should all be applied in keeping with the global plan for an artemisinin-resistance containment programme, to prevent the drug resistance parasites[12].

One of the most common problems associated with the poorly designed landfills and poorly managed solid waste is that it leads to attraction of large number of vectors such as female anopheles, which is responsible for causing diseases such as Malaria[15]. A survey was conducted for about 250 houses in six prone areas of vectors in Vijayawada. These areas mainly included Singh nagar Vombay Colony, Chintugunta. Ranigarithota,One Town, areas near Chlorea hospital which includes hilly mountains areas,Vidhyadharipuram, etc etc Krishna district, (10° 47′ 40.56″ N, 78° 41′ 6″ E)Andhra Pradesh, India. Krishna district lies at the heart of Andhra Pradesh. The district has an area of 8,727 square kilometers Krishna river flows through the length of the district and is the principal source of irrigation and water supply. The annual rainfall in the region is about 1028 mm and is contributed to by the Southwest monsoon The main hill range of the district known as Kondapalli runs between Nandigama and Vijayawada with a length of about 24 km. The other smaller hill ranges are Jammalavoidurgam, Mogalrajapuram and Indrakiladri hills.

Larval Collection

During the survey, all the containers and reachable tree holes. Larvae collection was carried outdoors by dipping, using pipette or dipper depending on container type and location. In this study, "outdoor" refers to the outside of building but confined to its immediate area. The number, type and water condition of containers which serve as a potential breeding site was examined and recorded using container index (CI). Number of container positive Container index = × 100 Number of container inspected. The collected larvae and pupae were kept in the laboratory for adult emergence. The emerged adult mosquitoes were then pinned and identified.

Figure 1. Anopheles Mosquito

Mosquito larvae sampling and identification

To collect mosquito larvae, one to ten dip samples were taken from each habitat using a standard 350 ml dipper (Clarke Mosquito Control Products, Roselle, IL) depending on the habitat size. Mosquito larvae were also sampled using 5 ml graduated pipettes from water bodies, which were too small to use standard dippers. For small habitats such as hoof prints, several hoof prints were pooled to get the required sample volume.

Mosquito predator and competitor sampling and identification

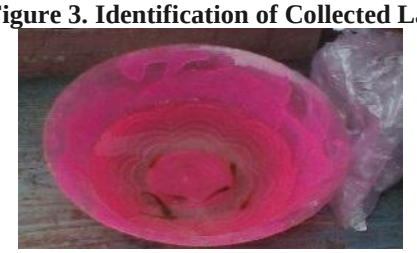
A rectangular frame net (30 × 20 cm) with a mesh size of 250 μm was used to sample mosquito predators and competitors at the same sampling sites where mosquito larvae sampling was carried out. Each collection entailed a 10 minute kick-sample with a hand net over a distance of 10 metres in the habitats that were sufficiently large.

Figure 2. sampling and identification

Identification of Collected Larvae

The collected specimens were preserved in plastic vials for further identification. Immature forms of mosquito larvae were collected by dipper method [8], reared in metal trays in the laboratory and fed with larval feed.

Figure 3. Identification of Collected Larvae



VECTOR CONTROL MEASURES

1. Source reduction
2. Anti larval activities a] Biological B} Chemical
3. Anti Adult mosquito measures a} indoor spray b} Outdoor spray
4. Health education on protection

1**) SOURCE REDUCTION**

To void water stagnations by filling low lying areas. It is carried out in two ways

1. Elimination or reduction of breeding sites primarily involving engineering methods.
2. Environmental manipulation.

Elimination or reduction of breeding sites

This aspect of source reduction are divided into

a) Filling

Filling has been done on minor scale for elimination of burrow pits, ditches, small unused irrigation canals unused/abandoned wells **Garbage** was used in filling of drains. This included mainly domestic and industrial waste. **Sanitary land fill** method was carried out dumping a layer of refuse/garbage in a selected area followed by earth cover daily after compaction

ANTI LARVAL ACTIVIES:

A} **Biological**: Released Gambusia fish in all medium and large fresh water bodies to remove mosquite larvae. *Gambusia* full grown fish eats about 100 to 300 mosquito larvae per day. *Gambusia* is a surface feeder; hence it is suitable for feeding on both anophelines and culicines. It frequents the margins of the water container, pond or other ground water collections, except where there is dense vegetation at the margins of the water body.

Figure 4. Gambusia Fishes are being sprayed in water.

Mosquito traps

A light trap that attracts and captures mosquitos.A traditional approach to controlling mosquito populations is the use of lethal ovitraps, which provide artificial breeding spots for mosquitoes to lay their eggs. These traps usually contain a chemical inside the trap that is used to kill the adult mosquito and/or the larvae in the trap The Insectides like DDT 50%, Malathion 25%, M.L.O are used in control of vector Female Anepoheles. About 1kg of DDT, 2kg of Malathion, 0.004kg of M.L.O are used of prepare 10liters of suspension. This has 10 to 12 (DDT), 6 to 8 (Malathion), 10-12 (M.L.O) As Residual effects in weeks. The Dosage per square Metre of active Ingredient are 1gram, 2gram, 20mg for DDT, Malathion & M.L.O respectively. The Frequency of application is weekly for all these Insectides.

Figure 5. Mosquito traps

ANTI ADULT MOSQUITO MEASURES:

A) **INDOOR SPRAY:**

1} Indoor Residual Spray: conducted malathion 25% solution spray on the surface of the walls of every house existing in high risk areas of vector borne diseases like Malaria Dengue, Filaria etc.

Figure 6. Indoor Residual Spray

2 Pyrethrum space spray: conducted Pyrethrum indoor space spray in all the houses situated in and around of Malaria and Dengue cases and high risk areas for the control of vector borne dieases.

B**) OUT DOOR SPRAY**: conducted malathion fogging operation once in aweek at high risk areas of malaria and Dengue fevers to control mosquitoes with hand fogging machines and vehicle mounted machines. Conducted health awareness camps in all high areas of Malaria and Dengue with all corporation Malaria staff District Malaria staff, Corporation, NMS, Community organizers under the supervision of health Educator and the following Measures are highlighted. Observation of Friday as Day to brea the life of mosquito proof netsClosure of doors in between 5' clock to 6 clock in the evening to avoid inflow of mosquitoes from outsides Using of mosquito repellents likes coils, ointments etc from mosquito bite.

RESULTS

About 36 Malarial vectors were being identified in Vombay colony colonynear singh nagar. Out of these we were able to control 29 mosquitoes. When as in Ranigarithota 48 mosquitoes larvae hence being identified using various sampling methods About 43 Malarial vectors were being identified in CHINTUGUNTA AREA. Out of these we were able to kill 37 mosquitoes. This included mainly Larvae of plasmodium vivax Whenas in AYODHYA NAGAR 34 mosquitoes larvae About 50 Malarial vectors were being identified in VIDYADHARIPURAM . Out of these we were able to control 42 mosquitoes About 40 Malarial vectors were being identified in AREA NEAR CHLOREA HOSTIPALONE TOWN (hilly areas). Out of these we were able to kill 32 mosquitoes Controls operations mainly included anti-larval openations such as release of Gambutsa fish which engulfed the larvae of mosquito in fresh water drains, drainage & in stangnant water.

1} **Indoor Residual Spray**: conducted malathion 25% solution spray on the surface of the walls of every house existing in high risk areas of vector borne diseases like Malaria etc.

2 **Pyrethrum space spray:** conducted Pyrethrum indoor space spray in all the houses situated in and around of Malaria.

The X axis represents areas in which project was carried out, it mainly includes, Singh nagar Vombay Colony, Chintugunta. Ranigarithota,One Town, areas near Chlorea hospital which includes hilly mountains areas,Vidhyadharipuram. Y Axis represents the number of vector of malaria that is being indentified and controlled. The total number of malaria vector indentified is 251. Out of these 247 belongs to Plasmodium Vivax, 4 belongs to Plasmodium falciparum in different areas. Out of this 206 vectors were controlled using different controlled measures.

Table 1. Observations

Name of the VECTOR	Vector-Borne Disease	Causative Agent	Breeding areas	Feeding Habits	Characteristic of Larvae	Life Span
Female Anopheles	Malaria	*Plasmodium Vivax*, *P.Falcipuram*	Drains, Drainage Stagnant Water, Peri-domestic Places	It is a zoophilic species When high densities build up relatively large numbers feed on men	It lays 150-200 eggs It can travel up to 1kms White in color and Submerged inside the water	30 Days

MALARIA

Table 2. First Week

Areas of Malaria Vector	PV	PF	Identified	Controlled
Vombay Colony(singh nagar)	35	1	36	29
Rani Garithota	47	1	48	39

PV=(Plasmodium vivax) PF=(Plasmodium Falciparum)

Table 3. Second Week

Areas of Malaria Vector	PV	PF	Identified	Controlled
Chintugunta area	43	0	43	37
Ayodhya nagar	33	1	34	27

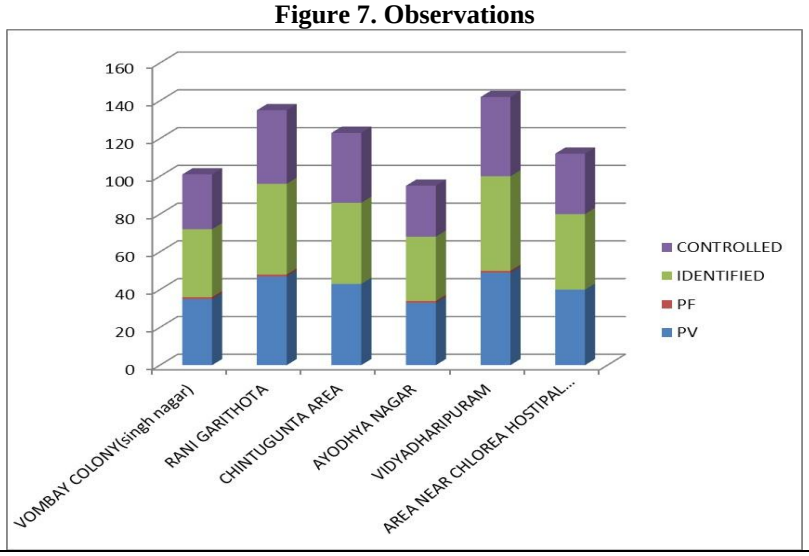
Table 4. Third Week

Areas of Malaria Vector	PV	PF	Identified	Controlled
Vidyadharipuram	49	1	50	42

Table 5. Fourth Week

Areas of Malaria Vector	PV	PF	Identified	Controlled
Area near Chlorea Hostipal One Town (Hilly Areas)	40	0	40	32

Figure 7. Observations



CONCLUSION

However, there are many more challenges that remain to be addressed to qualify for pre-elimination specific to Andhra Pradesh. To enumerate a few, the problem of asymptomatic malaria (parasite reservoir in the community) remains unattended, leaving many cases untreated and inadequate vector-control interventions along international/ interstate borders; this requires priority action to achieve a substantial reduction of transmission. In addition, Andhra pradesh is the major contributor for *P. falciparum* malaria that has become multi-resistant, and treatment of this remains a continuing challenges.

Among all type of containers surveyed, cement cistern (59.25%), mud pot (53.84), tyre (42.85), unused well (33.33), plastic container and vessels (25%) were positive for the mosquito larvae. The collected mosquito larvae included Female Anopheles Vectors. The source reduction is an effective way for the community The source reduction is an effective way for the community to manage the populations of many kinds of mosquitoes The eradication of mosquito breeding containers or breeding sites in and around living, working areas should be taken into consideration, since the presence of water in containers is probably the most important factor in determining the breeding of mosquitoes, The source reduction is an effective way for the community The source reduction is an effective way for the community to manage the populations of many kinds of mosquitoes The eradication of mosquito breeding containers or breeding sites in and around living, working areas should be taken into consideration, since the presence of water in containers is probably the most important factor in determining the breeding of Anopheles mosquitoes, especially a result, mosquito control programme should be established at krishna district. Such a programme would reduce the risk to both animals and human, and hence prevent the development of disease motivations in surrounding locations.

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